WHAT IS CLAIMED IS:

1. A method for retrospective internal gating comprising:

acquiring images at multiple z-locations $z_1 \ldots z_n$ and at different times $t_1 \ldots t_n$ at each of the z-locations; and

reordering the images at at least one of the z-locations to obtain a synchronized image set.

2. A method in accordance with Claim 1 further comprising:

extracting motion information from the images by using temporal data acquired at different times $t_1 \ldots t_n$ at each of the z-locations.

3. A method in accordance with Claim 2 wherein reordering comprises cyclically reordering the images at each of the z-locations by synchronizing the motion information to have a common starting point.

4. A method in accordance with Claim 2 wherein extracting comprises:

computing a mean intensity image from images at one of the z-locations;

dividing the mean intensity image into a matrix of blocks of a desired size of region of interest (ROI);

generating a binary image to distinguish organs that are imaged from a background of the binary image, wherein the organs include internal organs and an outer abdominal wall;

distinguishing the internal organs from the outer abdominal wall;

selecting ROI blocks from the binary image based on a pre-determined criteria;

measuring mean intensity values at times $t_1 \ldots t_n$ for each of the selected ROI blocks, the mean intensity values measured from temporal data acquired at different times $t_1 \ldots t_n$ at the z-location at which the mean intensity image is computed; and

plotting the mean intensity values as a function of times $t_1 \ldots t_n$ to provide motion information at each of the selected ROIs.

5. A method in accordance with Claim 4 wherein distinguishing the internal organs from the outer abdominal wall comprises performing a segmentation process to distinguish intensities of the internal organs from intensities of the outer abdominal wall.

6. A method in accordance with Claim 4 wherein distinguishing the internal organs from the outer abdominal wall comprises manually distinguishing the internal organ from the outer abdominal wall by:

depositing at least one seed in a pixel of the binary image; and

appending neighboring pixels to the seed, the neighboring pixels having properties similar to that of the pixel.

7. A method in accordance with Claim 4 wherein distinguishing the internal organs from the outer abdominal wall comprises automatically distinguishing the internal organs from the outer abdominal wall by connectivity and morphological operations.

8. A method in accordance with Claim 4 wherein the pre-determined criteria includes whether the selected ROI blocks are above a threshold.

9. A method in accordance with Claim 4 wherein the pre-determined criteria includes whether the selected ROI blocks are a part of at least one of the organs and the background.

10. A method in accordance with Claim 4 wherein generating the binary image comprises generating the binary image having various intensity values to distinguish the background from the organs.

11. A method in accordance with Claim 4 wherein extracting further comprises:

calculating maximas and minimas for each of the selected ROI blocks; and

selecting a reference time at which there is a highest number of occurrences of at least one of the maximas and the minimas.

12. A method in accordance with Claim 11 wherein extracting further comprises:

calculating at least one of a range of high points and a range of low points for each of the selected ROI blocks, wherein the range of the high points is a range of points around the maximas of the selected ROI blocks, and the range of low points is a range of points around the minimas of the selected ROI blocks; and

selecting a time at which there is a highest number of occurrences of at least one of the high points and the low points.

13. A method in accordance with Claim 11 further comprising:

marking all images that are scanned at the same time to designate as a reference at least one of the maximas with the highest number of occurrences and the minimas with the highest number of occurrences.

14. A method in accordance with Claim 13 wherein reordering comprises choosing a common reference point at each of the z-locations.

15. A method in accordance with Claim 1 wherein acquiring includes acquiring the images for a respiratory cycle of an object and at least one of a two-third and a complete gantry rotation.

16. A method in accordance with Claim 1 further comprising:

designating one of the images in a temporal sequence $t_1 \ldots t_n$ at one of the z-locations as a reference image;

determining a closest image in which motion of an organ is minimal with respect to a position of the organ in the reference image, the closest image being an image in the temporal sequence $t_1 \ldots t_n$ at a z-location adjacent the z-location of the reference image.

17. A method in accordance with Claim 16 wherein reordering comprises cyclically reordering images at the z-location of the closest image so that the closest image appears to be obtained at the same time as the reference image.

18. A method in accordance with Claim 16 wherein determining the closest image comprises:

identifying the organ boundary in the reference images and images at the z-location of the closest image, the images at the z-location of the closest image including the closest image;

extracting normal flow vectors from the organ boundary in the reference image and the images at the z-location of the closest image;

fitting the normal flow vectors within an affine motion model that outputs a measure of a motion of the organ;

comparing motions of the organ in the images at the z-location of the closest image with the motion of the organ in the reference image; and

determining based on the comparison the closest image in which the motion of the object is least among the motions of the object in the images at the z-location of the closest image.

19. A method in accordance with Claim 1 wherein reordering comprises cyclically reordering a four-dimensional (4D) image set of the images

based on at least one of 1-dimensional (1D) motion information of an organ that is imaged and 2-dimensional (2D) image information of the images, the cyclical reordering based on the 1D motion information providing a 1^{st} set of reordered images and the cyclical reordering based on the 2-D information providing a 2^{nd} set of reordered images.

20. A method in accordance with Claim 19 further comprising comparing the order of the first and second sets of reordered images to determine whether there is match between the orders of the first and the second sets.

21. A method in accordance with Claim 1 wherein acquiring the images includes acquiring the images for one breath cycle of an object plus at least one of 0.33 seconds and 0.5 seconds.

22. A computer-readable medium encoded with a program configured to:

acquire images at multiple z-locations $z_1 \ldots z_n$ and at different times $t_1 \ldots t_n$ at each of the z-locations; and

reorder the images at at least one of the z-locations to obtain a synchronized image set.

23. A computer configured to:

acquire images at multiple z-locations $z_1 \ldots z_n$ and at different times $t_1 \ldots t_n$ at each of the z-locations; and

reorder the images at at least one of the z-locations to obtain a synchronized image set.

24. An imaging system comprising:

a scanner configured to generate attenuation data by scanning an object; and

a controller electrically coupled to the scanner, the controller configured to:

acquire images at multiple z-locations $z_1 \ldots z_n$ and at different times $t_1 \ldots t_n$ at each of the z-locations; and

reorder the images at at least one of the z-locations to obtain a synchronized image set.

25. A computed tomography (CT) imaging system comprising:

a radiation source;

a radiation detector; and

a computer electrically coupled to the source and the detector, the computer configured to:

acquire CT images at multiple z-locations $z_1 \ldots z_n$ and at different times $t_1 \ldots t_n$ at each of the z-locations; and

reorder the CT images at at least one of the z-locations to obtain a synchronized image set.